

**HAND-HELD SELF-DEFENSE DEVICE**Background of the InventionField of the Invention

[0001] This invention, in one embodiment, relates to a personal defense device. Specifically, the defense device is intended to disable an assailant while reducing the risk of lethal injury. In another embodiment, the device also functions as a key chain, permitting the carrier to have immediate access to the device.

Description of the Related Art

[0002] Crime continues to be one of the greatest problems in our society. Locally, we struggle to reduce crime by installing alarm and surveillance systems, supporting public awareness programs and public services, and exercising increased vigilance. Nationally, the government has attempted to increase public safety by implementing various restrictions in public areas. While these national restrictions are intended to increase the general safety of the public, the restrictions may reduce the ability of individuals to defend themselves against assailants near public areas. For example, increased security of an airport may increase the safety of passenger aircraft. However, the restrictions may also reduce the ability of individuals to defend themselves while in the airport parking lot, while in the airport restroom, or while waiting for a shuttle or taxi.

[0003] Therefore, it is desirable to have a defense device that may be designed to fit a variety of sizes, ranging from small children to full-sized adults. The device should also be designed to pass the security regulations implemented in public buildings, amusement parks, and public transportation, particularly passenger aircraft.

Summary of the Invention

[0004] An exemplifying embodiment of the invention comprises an elongated shaft formed to fit in the user's palm. In one embodiment, the elongated shaft comprises a proximal and distal end, and a forward finger-receiving side and a rearward palm-receiving side. In one embodiment, the proximal end comprises an opening, the opening being sized

and configured to accommodate placement of a forefinger of a user through the opening. In a further embodiment, the distal end comprises one or more protrusions that constitute impact elements. When the device is used, the forefinger is placed through the opening and the one or more protrusions extend at least distally from the user's hand.

[0005] One method of using the personal defense device comprises providing a defense device with an elongated shaft, the elongated shaft having a proximal end, a distal end, a forward side, and a rearward side; an opening on the proximal end that is sized and configured to accommodate placement of a forefinger of a user through the opening; a palm-receiving surface on the rearward side; a finger-receiving surface on the forward side; and a protrusion extending distally of the device. The method further comprises inserting a forefinger of the user through the opening, placing the palm-receiving surface on the palm of the user, and placing the fingers on the finger-receiving surface. When the device is used in this manner, the protrusion extends distally of the user's hand.

#### Brief Description of the Drawings

[0006] The features of the present invention which are believed to be novel are set forth with particularity in the claims. The invention, together with further objects and advantages thereof, may best be understood by making reference to the following description taken in conjunction with the accompanying drawings, in the figures of which like referenced numerals identify the identical elements, and wherein:

- [0007] FIG. 1 is a perspective view of one embodiment of the defense device;
- [0008] FIG. 2 is a plan view of one embodiment of the defense device;
- [0009] FIG. 2A is a side view of one embodiment of the device, viewing a palm receiving surface;
- [0010] FIG. 3 is a perspective view of one embodiment of the defense device;
- [0011] FIG. 4 is a plan view of one embodiment of the defense device; and
- [0012] FIG. 5 is a view showing an embodiment of the defense device in the hand of a user.

#### Detailed Description of the Preferred Embodiment

[0013] With initial reference to **FIGURE 1**, an embodiment of the personal defense device 10 is illustrated in a perspective view. The defense device 10 preferably comprises an elongated shaft 12 that is adapted for grasping thereof by a user's hand. Preferably, the defense device 10 comprises a proximal end 14, a distal end 16, a forward side 18, and a rearward side 20. In one embodiment, the rearward side 20 of the elongated shaft 12 comprises an arcuate edge 22, forming a palm-receiving surface 24. Preferably, the palm-receiving surface 24 is designed to fit in the arcuate face of the palm when the hand is closed (as illustrated in **FIGURE 5**). The palm-receiving surface 24 may differ in curvature, shape, and size for various embodiments to accommodate different palm curvatures. In one embodiment, the palm-receiving surface 24 is convex. In other embodiments, the palm-receiving surface 24 may be shapes other than convex, such as straight, concave, straight and concave, concave and convex, straight and convex, etc.

[0014] As shown in **FIGURE 1**, the elongated shaft 12 may comprise one or more arcuate open sided finger receiving recesses 26 on the forward side. In the illustrated embodiment, the elongated shaft 12 comprises three finger-receiving recesses 26, but the device 10 could have more or less. In another embodiment, the recesses 26 may be different shapes. For example, the recesses 26 could be square, rectangular, triangular, etc.

[0015] With continued reference to **FIGURE 1**, the illustrated embodiment further comprises an opening 28 at the proximal end 14 of the elongated shaft 12. The opening 28 is sized and configured to accommodate a forefinger of a user when the user grasps the device 10. When the defense device 10 is used, the forefinger is placed through the opening 28, the remaining fingers are placed in the finger recesses 26, and the palm-receiving surface 24 rests on the palm of the hand (as shown in **FIGURE 5**). The opening 28 provides greater security, comfort, and practical stability for the use. When the user grasps the defense device 10 and places the forefinger through the opening 28, it is difficult for the defense device 10 to be knocked out of the user's hand. Preferably, the opening 28 surrounds a portion of the forefinger when the finger is placed in the opening 28 and the fist is closed. While the opening 28 in the illustrated embodiment is cylindrical, the opening 28 may be any shape that accommodates the forefinger. For example, the opening 28 may be square, oval, elliptical, rectangular, triangular, etc.

[0016] In a further embodiment, the opening 28 is designed to accommodate a key ring. With reference to **FIGURE 2**, in one embodiment, the opening 28 may further comprise a channel 30 on an inside surface 32 of the opening 28 to accommodate the key ring. While the illustrated embodiment shows a rectangular channel, the channel may vary in shape or depth. For example, the channel may be concave, triangular, etc.

[0017] In the illustrated embodiment of **FIGURE 2**, the opening 28 is comprised of a cylinder with a diameter 34. The length of the diameter 34 may vary, depending upon the user. Preferably, the diameter 34 is sufficiently long to accommodate the user's forefinger. In one embodiment, the diameter 34 is about one inch. In other embodiments, the diameter 34 may vary from about  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches. In yet further embodiments, the diameter 34 may vary significantly less than about  $\frac{1}{2}$  inch and significantly greater than about  $1\frac{1}{2}$  inches. An axis 36 of the device 10 is defined by a line that is tangent to both the rearward portion of the opening 28 and the distal-most recess 26.

[0018] With continued reference to **FIGURE 2**, in one embodiment, the elongated shaft 12 between the recesses 26, the opening 28, and the palm-receiving surface 24 comprises a grip 40 of the defense device 10. In the illustrated embodiment, a device width 42 is defined by a length perpendicular to the axis 36 between the trough of the recesses 26 and the palm-receiving surface 24. The device width 42 may vary depending upon the size of the user's hand. In one embodiment, the device width 42 may be the same for each recess 26. In other embodiments, the device width 42 may be different for some or each recess 26. Preferably, the device width 42 is a length whereby the grip 40 will fit comfortably within the user's hand. In one embodiment, the device width 42 is about one inch. In further embodiments, the device width 42 may vary from about  $\frac{1}{2}$  to 2 inches. In yet further embodiments, the device width 42 may vary significantly less than about  $\frac{1}{2}$  and significantly greater than 2 inches. In one embodiment, the device width 42 decreases from the proximal end 14 to the distal end 16. For example, the first recess may be about  $\frac{7}{8}$  inch, the second recess may be about  $\frac{3}{4}$  inch, and the third recess may be about  $\frac{5}{8}$  inch.

[0019] In some embodiments, the grip 40 is substantially the same texture or material as the rest of the defense device 10. In yet other embodiments, the surface of the grip 40 may be textured to increase the friction between the grip 40 and the palm of the hand by

means known to those of ordinary skill in the art. In further embodiments, the grip 40 may be covered or wrapped with material that will increase the friction between the grip 40 and the palm. In another embodiment, the grip 40 may be made of different material than other parts of the defense device 10. In yet further embodiments, the grip 40 may be altered by other means known to those of ordinary skill in the art to increase the user's ability to hold and retain the defense device 10.

[0020] With reference to **FIGURE 2**, in the illustrated embodiment, the elongated shaft 12 extends below the grip 40 at the distal end 16 to form one or more protrusions 44 that constitute impact elements of the defense device 10. In **FIGURE 2**, a protrusion length 46 represents the distance from the distal-most recess trough point 48, a point in the distal-most recess where the device width 42 is a minimum, to a protrusion tip point 50 that is the farthest point on the protrusion 44 from the axis 36, measured by a protrusion width 52. The distance along the axis 36 from the distal-most recess trough point 48 to the protrusion tip point 50 is measured by a protrusion tip point height 54. Preferably, the protrusion width 52 is long enough to effectively hook an orifice or pressure point on an assailant or to effectively strike an assailant. In one embodiment, the protrusion length 46, the protrusion width 52, and the protrusion tip point height 54 form a right triangle. In another embodiment, the protrusion width 52 and protrusion tip point height 54 are the same length. In other embodiments, the protrusion width 52 and protrusion tip point height 54 are different lengths. In one embodiment, the protrusion tip point height 54 or protrusion width 52 may be about one inch. In other embodiments, the protrusion tip point height 54 or protrusion width 52 may range from about ½ to 3 inches. In yet further embodiments, the protrusion tip point height 54 or protrusion width 52 may vary significantly less than about ½ inch and significantly greater than about 3 inches.

[0021] With continued reference to **FIGURE 2**, a protrusion height 56 represents the distance from the distal-most recess trough point 48 to a distal-most protrusion point 58, measured perpendicularly to the axis 36. In one embodiment, the protrusion height 56 is about one inch. In other embodiments, the protrusion height 56 may range from about ½ to 3 inches. In yet further embodiments, the protrusion height 56 may vary significantly less than about ½ inch and significantly greater than about 3 inches.

[0022] In the illustrated embodiment of **FIGURE 2**, the device **10** is shown with a protrusion **44**. In one embodiment, when the device **10** is used, the forefinger is placed through the opening **18** and remaining fingers are placed in the finger-receiving recesses **26**. The protrusion **44**, constituting an impact element, extends distally and forward of a pinky finger of a user's hand when the device **10** is grasped by the user.

[0023] In **FIGURE 2A**, the defense device **10** is shown by a side view perspective, viewing the palm-receiving surface **24**. A depth **60** of the device **10** is measured between a top face **61** and a bottom face **63** of the device **10**. Preferably, the top face **61** and the bottom face **63** are parallel to each other. The bottom and top faces **61**, **63** may also comprise decorations or graphics. Preferably, the depth **60** is of such a length whereby the device **10** is held comfortably in the user's hand. In one embodiment, the depth **60** may be about  $\frac{1}{2}$  inch. In other embodiments, the depth **60** may range from about  $\frac{1}{4}$  to  $1\frac{1}{2}$  inches. In further embodiments, the depth **60** may vary significantly less than about  $\frac{1}{4}$  inch and significantly greater than about  $1\frac{1}{2}$  inches. In some embodiments, the depth **60** of the device **10** may be substantially uniform throughout the device **10**, including the portion defining the opening **28**. In other embodiments, the depth **60** may vary in the same device **10**. For example, in one embodiment, the grip **40** may have a greater depth **60** than the proximal **14** and distal **16** portions of the device **10**.

[0024] Continuing reference to **FIGURE 2A**, a defense device length **62** is measured by the distance between the proximal-most point to the distal-most point of the defense device **10**. In one embodiment, the defense device length **62** is about 5 inches. In other embodiments, the defense device length **62** may range from about  $3\frac{1}{2}$  to  $6\frac{1}{2}$  inches. In further embodiments, the defense device length **62** may vary significantly less than about  $3\frac{1}{2}$  inches and significantly greater than about  $6\frac{1}{2}$  inches. The length can be selected to accommodate a wide variety of user's hands.

[0025] In **FIGURE 3**, a further embodiment is illustrated that shows a rearward protrusion **64** that may extend in the direction of the palm-receiving surface **24**. In this embodiment, the rearward protrusion **64** may operate as both an impact element and a lever against which the bottom of the user's hand may press for leverage while using the defense device **10**. In some embodiments, the protrusions **44**, **64** may form a striking surface **66** that

will permit the user to strike an assailant with a downward thrusting motion. In some embodiments, the protrusions 44, 64 and the striking surface 66 constitute an impact element. In yet further embodiments, one or more protrusions (not shown) may extend from the defense device 10 near the opening 28. In one embodiment, there may be multiple protrusions 44, 64 that are the same length or shape. In other embodiments, the protrusions 44, 64 may vary in length and shape. For example, in various embodiments, the protrusions 44, 64 may be triangular, square, rectangular, oval, circular, etc. In **FIGURE 3**, an embodiment is shown where the impact element constitutes a forward protrusion 44 and a rearward protrusion 64 that is a double fin-shape with blunt tips. In **FIGURE 2**, an embodiment is shown where the impact element constitutes a forward protrusion 44 that is a single fin-shape with blunt tips.

[0026] Preferably, the protrusions 44, 64 and the striking surface 66 comprise round edges to prevent lethal injury and to comply with security regulations in many amusement parks, public buildings, and public transportation, particularly passenger aircraft. In one embodiment, the edges or corners of the device 10 are rounded or trimmed as illustrated by the rounded proximal 14 and distal 16 ends in **FIGURE 2A**. The corners may be rounded or trimmed to form shapes such as a triangle, trapezoidal, etc. In another embodiment, some edges or corners may be rounded or trimmed while others are not. In yet another embodiment, the edges or corners are not rounded or trimmed.

[0027] With reference to **FIGURE 4**, the defense device 10 is shown in a plan view. In the illustrated embodiment, a rearward protrusion 64 is shown. A rearward protrusion length 68 represents the distance from the distal-most recess trough point 48 to a rearward protrusion tip point 70 that is the farthest point on the rearward protrusion 64 from the axis 36, measured by a rearward protrusion width 72. The distance along the axis 36 from the distal-most recess trough point 48 to the rearward protrusion tip point 70 is measured by a rearward protrusion tip point height 74. In one embodiment, the rearward protrusion length 68, the rearward protrusion width 72, and the rearward protrusion tip point height 74 form a right triangle. In another embodiment, the rearward protrusion width 72 and rearward protrusion tip point height 74 are the same length. In other embodiments, the rearward protrusion width 72 and rearward protrusion tip point height 74 are different lengths. In one embodiment, the rearward protrusion tip point height 74 or rearward protrusion width 72 may

be about one inch. In other embodiments, the rearward protrusion tip point height 74 or rearward protrusion width 72 may range from about ½ to 3½ inches. In yet further embodiments, the rearward protrusion tip point height 74 or rearward protrusion width 72 may vary significantly less than about ½ inch and significantly greater than about 3½ inches.

[0028] With continued reference to **FIGURE 4**, a rearward protrusion height 76 represents the distance from a distal-most recess trough point 48 to a distal-most rearward protrusion point 78, measured perpendicularly to the axis 36. In one embodiment, the rearward protrusion height 76 is about 1½ inches. In other embodiments, the rearward protrusion height 76 may range from about ½ to 3 inches. In yet further embodiments, the rearward protrusion height 76 may vary significantly less than about ½ inch and significantly greater than about 3 inches.

[0029] The defense device 10 may be used to hook orifices or pressure points on the assailant, or it may also be used by striking the assailant with the protrusions 44, 64 or striking surface 66. One method of using the defense device comprises providing a defense device with an elongated shaft, the elongated shaft having a proximal end, a distal end, a forward side, and a rearward side; an opening on the proximal end that is sized and configured to accommodate placement of a forefinger of a user through the opening; a palm-receiving surface on the rearward side; a finger-receiving surface on the forward side; and a protrusion extending distally of the device. The method further comprises inserting a forefinger of the user through the opening, placing the palm-receiving surface on the palm of the user, and placing the fingers on the finger-receiving surface. When the device is used in this manner, the protrusion extends distally of the user's hand. The device can be used to strike an assailant by a thrusting motion, such as forward, rearward, upward, downward, etc. The device may also be used to hook an assailant's orifice or pressure point, such as the mouth, eye, ear, etc. It has been determined that the impact of the defense device 10 will cause disabling non-lethal force or pain to various parts of the body, particularly parts without significant amounts of tissue between the skin and bone. For example, the defense device 10 may apply disabling non-lethal force or pain to the hand, wrist, elbow, foot, ankle, shin, knee, collar, shoulder, jaw, cheek, or skull. The disabling force or pain can be applied while reducing the possibility of lethal injury.



[0030] In one embodiment, the defense device 10 is constructed from wood. Suitable wood may be relatively dense wood, for example maple or hickory. The wood may also be relatively soft and lightweight, such as pine and poplar. Any type of wood falling within or beyond these examples' range of density may also be used. In other embodiments, the defense device 10 may be made of materials other than wood that are known by those of ordinary skill in the art. For example, other materials may include plastics, composites, ceramics, metals, etc. In other embodiments, the defense device 10 may comprise combinations of such materials. As shown in **FIGURE 1** and **FIGURE 3**, in the illustrated embodiments, the elongated shaft 12 is fabricated of one piece of material. In other embodiments, the elongated shaft 12 may comprise multiple pieces of the same material or multiple pieces of different materials.

[0031] Although this defense device 10 has been disclosed in the context of certain preferred embodiments and examples, it will be understood by those skilled in the art that the defense device 10 extends beyond the specifically disclosed embodiments to other alternative embodiments and/or uses of the defense device 10 and obvious modifications and equivalents thereof. In addition, while a number of variations of the defense device 10 have been shown and described in detail, other modifications, which are within the scope of this device 10, will be readily apparent to those of skill in the art based upon this disclosure. It is also contemplated that various combinations or subcombinations of the specific features and aspects of the embodiments may be made and still fall within the scope of the device 10. Accordingly, it should be understood that various features and aspects of the disclosed embodiments can be combined with or substituted for one another in order to form varying modes of the disclosed defense device 10. Thus, it is intended that the scope of the defense device 10 herein disclosed should not be limited by the particular disclosed embodiments described above, but should be determined only by a fair reading of the claims that follow.